

302b Microfluidics for Combinatorial Synthesis and Screening on Chip

Michael W. Toepke, Ian D. Block, Vitaliy Nesterenko, Charles J. Choi, Benjamin Schudel, Brian T. Cunningham, Paul J. Hergenrother, and Paul J. A. Kenis

Combinatorial chemical studies are generally characterized by the synthesis of a large number of potentially relevant compounds and subsequent testing of said compounds for specific properties. The utility of combinatorial chemistry as a means for discovering compounds of interest rests in the simplicity of the method, as minimal mechanistic knowledge of the system is needed. The relative success of a combinatorial screening depends largely on the number of compounds that are evaluated. The difficulty of the technique lies in the sheer size of the parameter space that can be explored. One of the greatest advantages of microfluidics is the small volume of material that is required to perform an individual assay. Arrays of nanoliter reaction volumes can easily be made using a microfluidic device. Such a device consumes several orders of magnitude less material than the standard well plates that are commonly used for combinatorial synthesis, providing the potential for a corresponding increase in the number of compounds that could be synthesized. The present work demonstrates the fabrication of a microfluidic device for the combinatorial synthesis of a library of small molecules and subsequent screening of the library using integrated detection. The talk will discuss device fabrication, library synthesis, and binding affinity studies.